NCDOT GEU FIELD PERSONNEL ON SITE CHECK LIST

I. Project and Situational Awareness

a. Have RFP on person and understand the reason and scope of the investigation.
b. Have project plans, profiles, cross sections, bridge survey report (BSR), Preliminary General Drawing (PGD) on person.
c. Understanding of logistical issues for the site (property owners, access to drill sites, utilities, traffic control and regulation).
d. Confirm all utilities have been called in and cleared through 811.
e. Understanding of the NCDOT GEU legend and NCDOT GEU Manual.
f. Familiar with the general geologic setting, rock type common to the area, or Coastal Plain Formations that may be encountered.
g. An understanding of the different types of origins, and how to identify between them (Roadway Embankment, Artificial Fill, Alluvium, Colluvium, Residual, Triassic Residual, Weathered Rock, Crystalline and Non-Crystalline Rock, Coastal Plain soils, and Coastal Plain Rock)
h. Understanding when rock or muck soundings are required. See manual for further details on performing soundings.
i. Natural Resources Technical Report (NRTR, "Green Sheet") moratoriums, environmental permits, municipality/county permits, railroad entry permits (follow RR specifications), Atlantic Sturgeon Critical Habitat, Sensitive Aquatic Vegetation (SAV), etc.
j. Confirm that Division has been notified of traffic control requirements and driveNC.gov (formally TIMS) has been updated.

II. Safety Awareness

a. Conduct safety meeting with specific topics relevant to the project prior to the start of the workday.
b. Familiarity with MUTCD and requirements for traffic control set up.
c. All PPE are present and appropriate for the job.
d. Evidence that Field Professional is aware of nearby medical facility.

III. Forms and Equipment

a. Have all potential GEU NCDOT forms needed for investigation (Daily Activity Logs, Bridge Boring Logs, Roadway Boring Logs, Core Logs, Survey Notes). All forms are located on the Geotechnical Connect site under Cells, Details, and Forms https://connect.ncdot.gov/resources/Geological/Pages/Geotech_Forms_Details.aspx.
b. Copy of the GEU NCDOT legend
c. NCDOT Estimated Driven Pile Axial Resistance Table
d. All projects require a Nation Wide 6 (NW6) permit to be on site; Other Permits may also include (CAMA, special NW6, Forestry, etc.)
e. In the event a project is in railroad right of way, a right of entry permit will be needed on site.
f. Engineers Scale, measuring tape, soil sample containers/bags, rock hammer, duct tape, rock core boxes, appropriate writing utensils for logging boreholes, soil sample containers, rock boxes, white flagging, white paint, etc.

g. If consolidation and triaxial testing are needed for the project then the field professional needs to be familiar with collecting, sealing and transporting Shelby tube samples to the lab.

IV. AASHTO Classification of Soil

a. Check field professional's understanding of group classifications and their nomenclature
    - Each major component has at the most one modifier, i.e. silty SAND.
    - **A-1-a**; Gravel/Stone fragments, may contain fine grain material.
    - **A-1-b**; Coarse sand, may contain fine grain material
    - **A-3**; fine sand, no or little fine grain material
    - **A-2-4/A-2-5**; silty sand
    - **A-2-6/A-2-7**; clayey sand
    - **A-4**; sandy silt, contains over 36% of silt, with sandy material.
    - **A-5**; clayey silt, usually exhibits diatomaceous or micaceous character.
    - **A-6**; sandy clay; contains over 36% of clay with sandy material.
    - **A-7-5**; silty clay; Liquid Limit less than or equal to 30.
    - **A-7-6**; silty clay; Liquid Limit greater than 30. It can be difficult to distinguish between A-7-5 and A-7-6.
    - Organic coarse and fine grain soils and muck.
    - Naming convention for percentage of materials found in samples, such as gravel, organic matter, mica, etc. (see legend for table).

V. Field Boring Log Content

a. Make sure the project and boring information is filled out to the best of ability at the time when the information is known. The log should have the following:
    - WBS,
    - TIP,
    - Project Description,
    - Boring Designation,
    - Name of field professional logging the boring,
    - Rig and Driller information,
    - Station and offset,
    - Northing and Easting, if available at time of drilling,
    - Elevation (only if the hub has been surveyed in the field),
    - Water level readings (if available). If boring is filled in after drilling with no water table reading, use the acronym FIAD. Make sure to measure to bottom of hole as well.

    Please note, some items will need to be filled out/redlined after field work is complete. Station and offset are recorded to the nearest foot and depths are recorded to the tenth of a foot.

b. Split Spoon Sampling
    - Accurate depth of sample measured in field, including noting the possibility of potential fall in (fluff) and actual sample material.
    - Proper enumeration of blow counts (n-value) (1.5-foot sample)
    - Understanding of 60 and 100 blow count over 1 foot or less penetration criteria (Reference to Legend for definition of Hard Rock)
        - Coastal Plain
            a. 100/<1.0 foot of penetration can be considered Coastal Plain Sedimentary Rock (CP), or it can be associated with lenses or layers of cemented zones within Coastal Plain sediments. Due to these conditions, it is required that a 100-blow count drive only be terminated in the 1st 0.5 foot if less than 0.5-foot penetration is obtained. Otherwise, blows in the 1st interval should not count towards a 100/<1.0-foot measurement.
            b. 60/0.0 or 60/0.1 may not lead to drilling refusal. Depending on the project, drilling may continue, or coring will need to begin. If tricone refusal is reached, then 60/0.0 or 60/0.1 is considered refusal on/in Coastal Plain Sedimentary Rock (CP).
        - Piedmont/Mountain
            a. 100/<1.0 foot of penetration is considered Weathered Rock (WR). This can be over any consecutive drive.
            b. 60/0.0 or 60/0.1 is considered refusal on/in Crystalline Rock (CR) or Non-Crystalline Rock (NCR). It may also occur on/in boulders (fill/alluvial/colluvial).
c. Properly fill out blow count graph
d. Sequential sampling numbers for entire project. No sample number shall repeat. The field professional may use reference samples in larger roadway projects. Sample containers or bags should include the following information:
    - TIP
    - Boring Designation
    - Sample Number
    - Sample Depth
    - Blow Counts
e. Moisture (Dry, Moist, Wet, Saturated). This is not to be used for WR samples.
f. Understanding and identifying proper origin of material (Roadway Embankment, Artificial Fill, Alluvium, Colluvium, Residual, Triassic Residual, Weathered Rock, Crystalline and Non-Crystalline Rock, Coastal Plain soils, and Coastal Plain Rock)
g. Soil Description to include the following:
    - Color (keep it simple)
    - Density/consistency (see legend)
    - Plasticity (roadway only)
    - Grain size description (if applicable)
    - Tertiary soil component (if applicable)
    - Secondary soil component

- Primary soil component
- AASHTO Classification
- Any organics, gravel, mica, using proper language for percentage of material as seen in the legend (trace, little, moderately, some, highly).
- Any other descriptors that help classify the soil (Triassic, saprolitic, mottled, etc.)

h. Rock descriptions (WR, CR, NCR, CP) can be classified by type of rock (granite, gneiss, meta-volcanic rock, sandstone, mudstone, etc.).

i. Include appropriate termination statement:
   - Non-Refusal: Boring Terminated at elevation/depth in Origin: Soil Type (include Formation name if in Coastal Plain).
   - 60/0.0: Boring Terminated with SPT Refusal at elevation/depth ON Origin: Rock Type
   - 60/0.1: Boring Terminated with SPT Refusal at elevation/depth IN Origin: Rock Type
   - Coring Terminated at elevation/depth IN Origin: Rock Type

j. Notes may include pavement details, root mat description, loss of circulation, details about location/relocation of boring, observations at location, depth to water, depth to mudline/ground surface (from bridge or barge deck).

VI. Field Coring Log Content

a. Depths should be measured accurately at the beginning and end of a core run, along with total length of core run.

b. The field professional should have a way to observe and record drill rates in minutes (00:00) per foot.

c. Make observations such as circulation loss, change in water color, increase or decrease in drilling speed and pressure. These observations assist in determining loss of recovery or change in material weathering or rock type.

d. Understand how to calculate the Core Run Recovery percentage ([total core recovered/total core run length] *100) and RQD percentage ([total length of pieces greater than 4”/total run length] *100). This also includes Strata Run Recovery and Strata RQD.

e. Core Log Strata Descriptions:
   - Soil – If there is indication of soil while coring, a SPT sample should be taken between core runs to confirm n-value and material type. Description should follow soil conventions, and record Recovery %. RQD will be N/A for soil materials.
   - No Recovery (weathered rock) – Indicate type of weathered rock based on information above or below. Record Recovery %. RQD will be N/A for weathered rock materials.
   - Recovered Weathered Rock (WR) – A full description will be needed. Record Recovery %. RQD will be N/A for weathered rock materials.
     - Weathered Rock (Origin: CR): Strata Description should include *Color, Weathering, Rock Hardness, Fracture Spacing, and Rock Type.*

    - Weathered Rock (Origin: NCR): Strata Description should include *Color, Weathering, Rock Hardness, Fracture Spacing, Bedding, Induration, and Rock Type.*
  - Crystalline Rock (CR): Strata Description should include *Color, Weathering, Rock Hardness, Fracture Spacing, Rock Type*. Record Strata Recovery and RQD.
  - Non-Crystalline Rock (NCR): Strata Description should include *Color, Weathering, Rock Hardness, Fracture Spacing, Bedding, Induration, and Rock Type.* Please note, weathering can be difficult to determine in Triassic rock samples. Record Strata Recovery and RQD.
  - Coastal Plain Sedimentary Rock (CP) Strata Description should include *Color, Weathering, Rock Hardness, Fracture Spacing, Bedding, Induration, Rock Type, and Formation Name*. Record Strata Recovery and RQD.

f. Additional details such as fracture angles can be added to strata descriptions if desired. This data could be important in the event of roadway/rock cuts.

g. Sample # should not be added until rock core has been selected for compression testing. At that time, it will be redlined on field logs as RS-x, with the depth range.

h. Rock Core Boxes should be labeled properly.
  - Rock should be placed in a core box beginning left to right, top to bottom.
  - Top of box should include Project WBS, TIP, Project Description, County, Depth of Start and End, Core Runs that are included in the box with Core Run start and end depth, Recovery and RQD.
  - Box Bottoms should at minimum have Project WBS, TIP, County, Boring Designation, Box no., Beginning and Ending Depths.
  - Beginning and Ending of Core Runs should be labeled with spacers.
  - Areas where notable loss of material was observed should have a spacer placed if possible.
  - Mechanical breaks should be marked with double hash marks on both sides of the break.

VII. Additional Tasks During and After Drilling for Field Professionals

a. Maintain Daily Activity log whenever activity is on site. Use NCDOT provided form and record the following:
  - Crew members on site
  - Additional firms on site (i.e. Traffic control)
  - Travel time for field professional and drill crew
  - Load/unload
  - Break downs/ Maintenance
  - Borings drilled
  - Crew time elements:
    - Water for coring
    - Coring through bridge deck
    - Clean up of site
    - Utility clearance
    - Property owner delay

    - Limited weather delays

b. Obtain groundwater readings at boring holes at 0-hour (termination of boring) and 24-hours.
c. Make sure borings are appropriately abandoned.
d. Clean up any excessive soil material in road, sweep excess water from road if there is the threat of freezing temperatures.
e. Contact 811 if any utilities are struck during operations, in addition, alert PEF project manager and NCDOT Technical Lead.
f. Contact Technical Investigation Lead and the GeoEnvironmental Engineering Supervisor if any contamination is encountered on site.
g. If there is any damage done during ingress or egress of drill equipment, take pictures to document extent, alert NCDOT and PEF Project Manager. If it can be easily repaired, do so immediately. More extensive damage will require a repair plan submitted to the contract manager for approval, if damage results in mitigation or litigation.
h. No trash should be left on site.